Exhibit 4: Road Management and Erosion Control Plan

PACIFIC WATERSHED ASSOCIATES

To: **Nathan Boone, Sonoma Land Trust**
From: **John Green, Pacific Watershed Associates**

Re: **Road erosion control plan for SLT Estero Americano property**

Date: **July 9, 2004**

Hello Nathan,

Below is a brief report outlining the current road conditions on Sonoma Land Trust's Estero Americano property and the access road from Estero Lane, as well as a summary and cost estimate for the upgrade recommendations we discussed.

Introduction

The Sonoma Land Trust's (SLT) Estero Americano property is comprised of two parcels totaling 160 acres adjacent to the Estero Americano, south of the town of Bodega Bay in western Sonoma County. The SLT property extends north from the north shore of the estero toward Estero Lane, which is the sole public access road in the vicinity. An unnamed, gravel-surfaced private road runs south from Estero Lane for approximately a quarter of a mile to near the edge of the SLT parcel. From this point, a lightly used dirt access road continues south to the SLT property, and then follows a ridge axis to the southwest before dropping steeply for 200 feet in elevation to the north shore of Estero Americano. Both the main access road and the dirt road are used by SLT staff as well as three adjacent landowners for property access. Use of the dirt road is very light, and is confined primarily to the dry season. The area is dominated by grassland with a history of moderate to high intensity grazing and ranching uses. The SLT property is managed for long-term preservation, and no grazing is currently permitted.

This plan addresses current and potential erosion issues on both the main access road and the dirt road.

Main access road

Current conditions

This road measures approximately ¼ mile from Estero Lane to the turnoff for the SLT property. It is a mid-slope road fifteen to twenty feet in width, averaging a seven percent grade. The road is very mildly outsloped along most of its length, with an inboard ditch drained by three failing 12" steel ditch relief culverts (DRC). Two of these DRCs drain long stretches of road, and have caused the formation of gullies at the DRC outlets. Both of these gullies deliver sediment to Class 3 streams draining to the Estero Americano. These two DRCs are also rusted completely through the bottom, and flow escaping from the culverts is currently eroding the road fill. The cutbanks vary in height from three to ten feet, and have experienced sporadic mass failures in the past, some of which are still active. The road outslope is ineffective in draining the road surface because of the presence along most of its length of a small berm measuring up to one foot in height. The road bed is in generally good condition, but shows some signs of rutting resulting from water flow along the length of the road. It has recently been resurfaced with gravel.

Recommendations:

1. Install 6 new 18" x 30' ditch relief culverts. These DRCs will replace the failing culverts and more effectively disperse road and cutbank drainage, preventing gully erosion. Placement of the new culverts at the base of the road fill will prevent erosion of the fill face at the DRC outlet. The old DRCs can be left in place, but their inlets should be crushed and/or buried to prevent water from continuing to flow through them.
2. Remove the small berm along 1100' of road to facilitate road drainage to the outboard fill slope.
3. Install 6 rolling dips adjacent to the 6 new DRCs to prevent road drainage from eroding the road bed and outboard fill face should ruts develop.
4. Resurface the DRC and rolling dip installation sites with 1.5" minus rock. A total of 90 cubic yards will be required for these upgrades.

Sonoma Land Trust dirt road

Current conditions

The dirt road measures approximately nine-tenths of a mile from the main access road to the north shore of Estero Americano. The first two-tenths of a mile from the main access road are not on SLT property, but are essentially flat and show no evidence of erosion. From the gate at the SLT property line, the road lies along the ridge axis for another two-tenths of a mile, averaging ten feet in width at a seven percent grade. This section of the road shows little evidence of erosion, although it is becoming slightly through-cut.

At the end of the ridgetop section, the road makes a 90-degree left turn and begins to descend at an eight percent grade along the right side of the ridge. This section has no inboard ditch, but is prone to rutting and could develop erosion problems in the future.

The road then switches back around the ridge, and descends steeply across the hillslope for about a third of a mile at an average grade of fifteen percent. This section of the road is insloped, with rilling occurring due to insufficient drainage along its entire length. The cutbanks vary in height from three to eight feet and have experienced mass failures in the past, but are laid back to a 1:1

slope and well-vegetated. The road has an inboard ditch drained by DRCs in two locations. The upper DRC drains approximately 500 feet of road to a swale, but shows little evidence of gully erosion at its outlet. This culvert is rusted through and road fill is collapsing into it. Old grade control structures (chevrons) exist in the swale below the DRC, and appear to have been effective at controlling erosion. The lower DRC drains roughly 800 feet of road onto a steep hillslope at the nose of the ridge. A gully averaging two feet in width and two feet in depth extends from the DRC outlet to the base of the slope (60 feet), with a fan of deposited material at the base.

The bottom 300 feet of the road has an average seventeen percent grade with an inboard ditch and cutbanks averaging six feet in height and which show evidence of numerous past failures. The road is rilled, and the road surface and inboard ditch outfall at the bottom of the slope to a broad flat area. Another fan of deposited material eroded from the road surface, ditch and cutbank has formed in this area, which is adjacent to a Class 2 stream approximately 500 feet upstream of its outlet at the estero. It is very likely that eroded sediment from this section of road is delivered to the stream during wet periods.

Recommendations:

1. Outslope a total of 1500 feet of road from the switchback to the bottom of the slope. Pull any berm material and use it for outsloping and to fill the inboard ditch. This treatment will allow any emergent water from the cutbanks to cross the road and infiltrate the soil, rather than flowing along the road. The existing DRCs can be left in place and their inlets will be buried.
2. Install a total of 11 rolling dips in locations determined by road grade to prevent any road drainage from eroding the road bed and outboard fill face should ruts develop.
3. Resurface the rolling dip installations on the road below the ridgetop (9 rolling dips) with 1.5" minus road rock. A total of 135 cubic yards will be required for these upgrades.

Budget

A project budget detailing the costs of implementing the recommendations in this report follows.

Thanks for giving us the opportunity to work on the Estero Americano project. I look forward to working with you on implementing these road upgrades.

Sincerely,

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